

**S/C Viewing Separation Angle Of Stations**  
**Iridium S/C Viewing of Stations**  
**Station View For Portland, Maine (Odyssey)**  
**Secondary Station: Spokane (Iridium)**  
**Odyssey Tracking At 5 Minute time Tics**

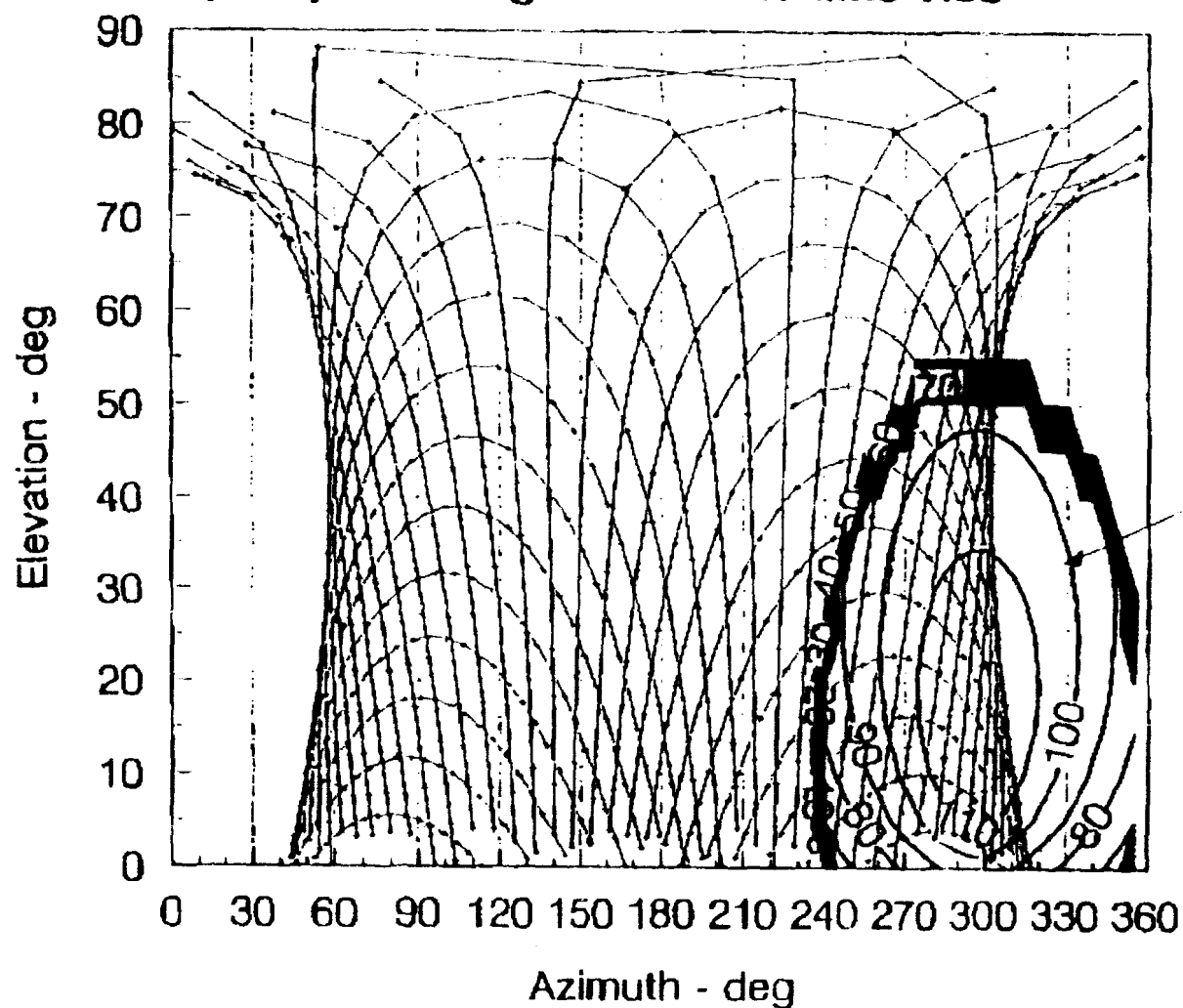


Figure 3-11

**S/C Viewing Separation Angle Of Stations**  
**Iridium S/C Viewing of Stations**  
**Station View For Portland, Maine (Odyssey)**  
**Secondary Station: Kansas City (Iridium)**  
**Odyssey Tracking At 5 Minute time Ticks**

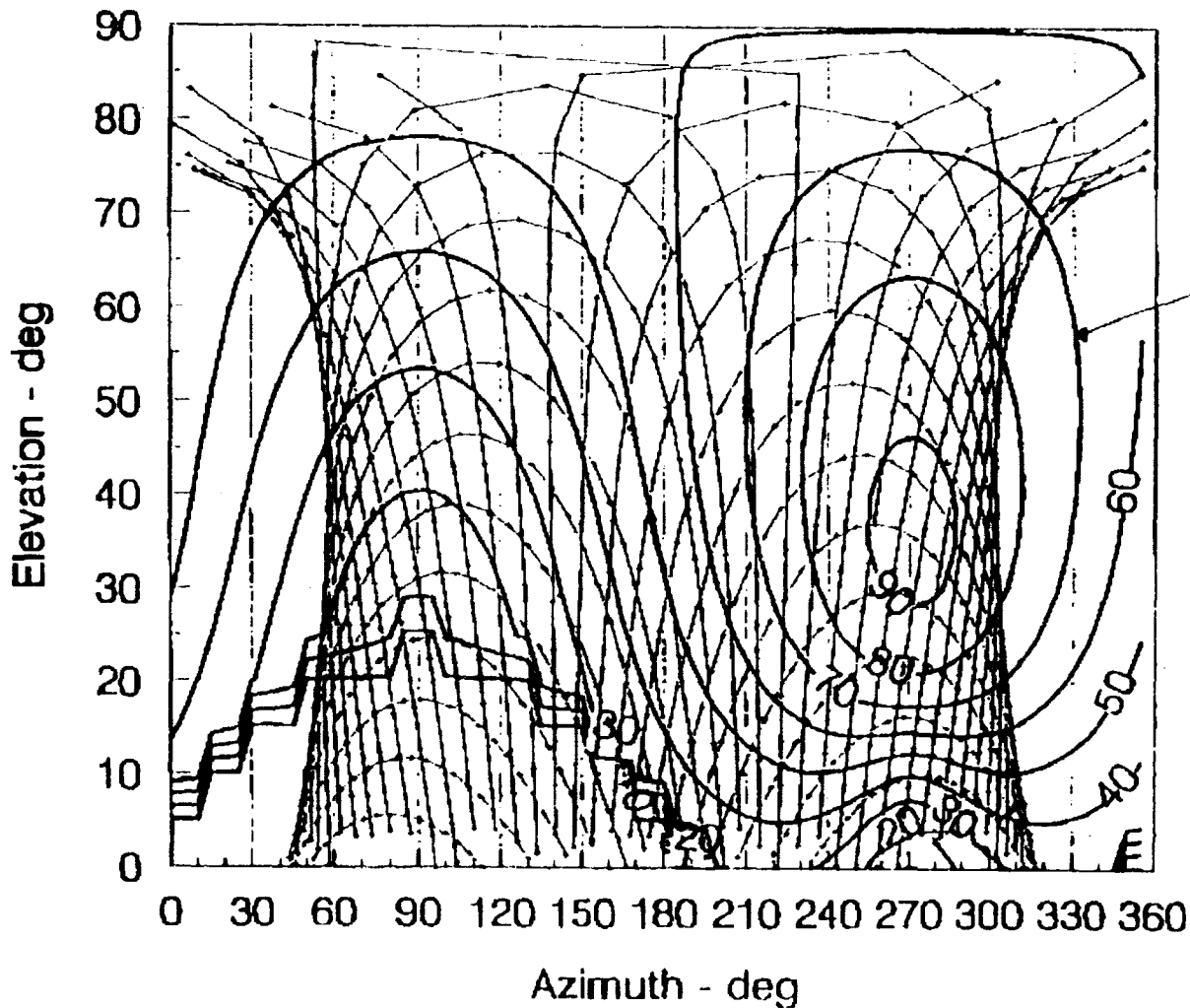
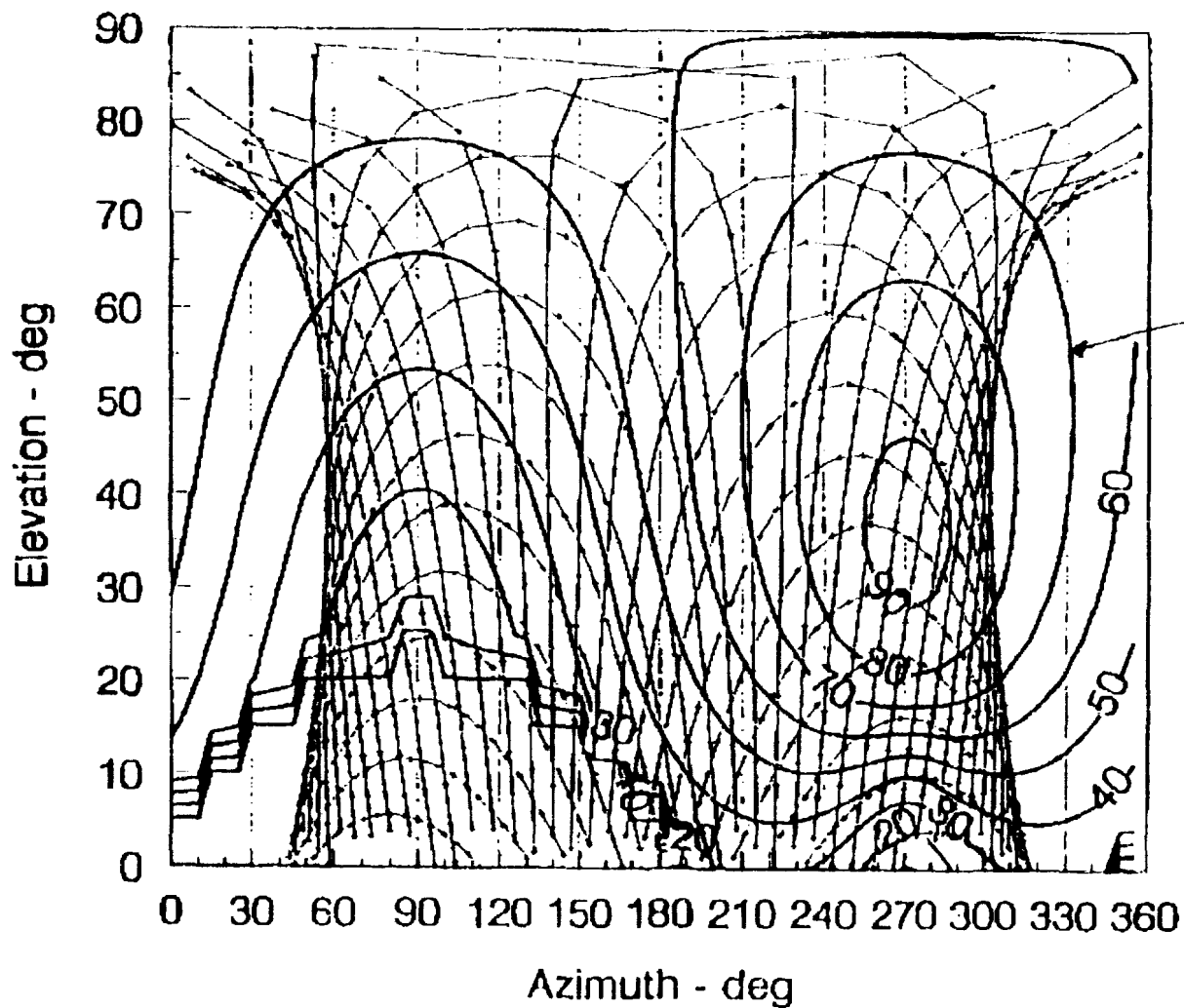


Figure 3-12

**S/C Viewing Separation Angle Of Stations**  
**Iridium S/C Viewing of Stations**  
**Station View For Portland, Maine (Odyssey)**  
**Secondary Station: Montpelier (Iridium)**  
**Odyssey Tracking At 5 Minute time Tics**



Separation Angle For  
Iridium S/C Viewing  
Of Earth Stations

Figure 3-13

**S/C Viewing Separation Angle Of Stations**  
**Iridium S/C Viewing of Stations**  
**Station View For Portland, Maine (Odyssey)**  
**Secondary Station: Las Vegas (Iridium)**  
**Odyssey Tracking At 5 Minute time Ticks**

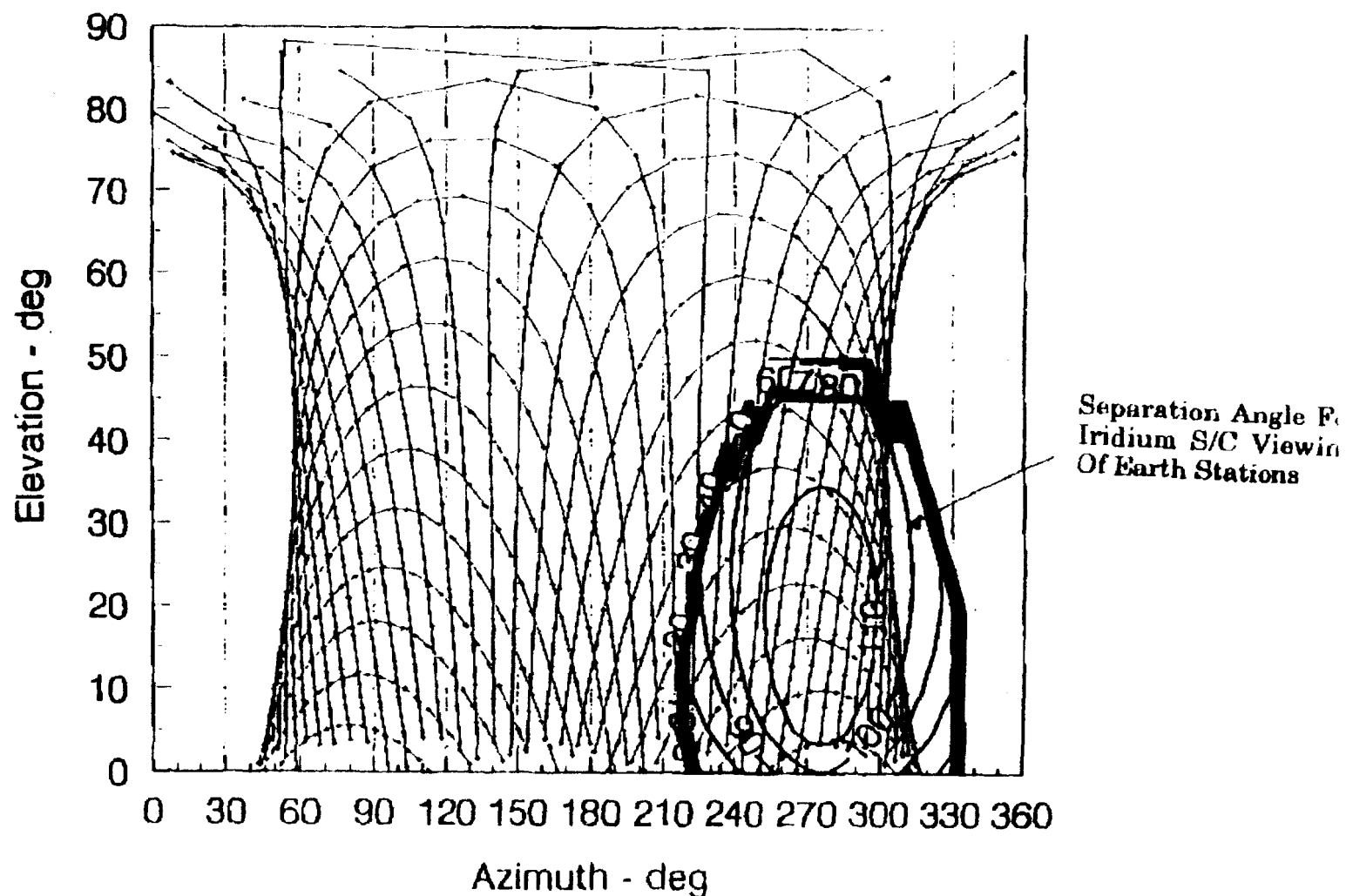
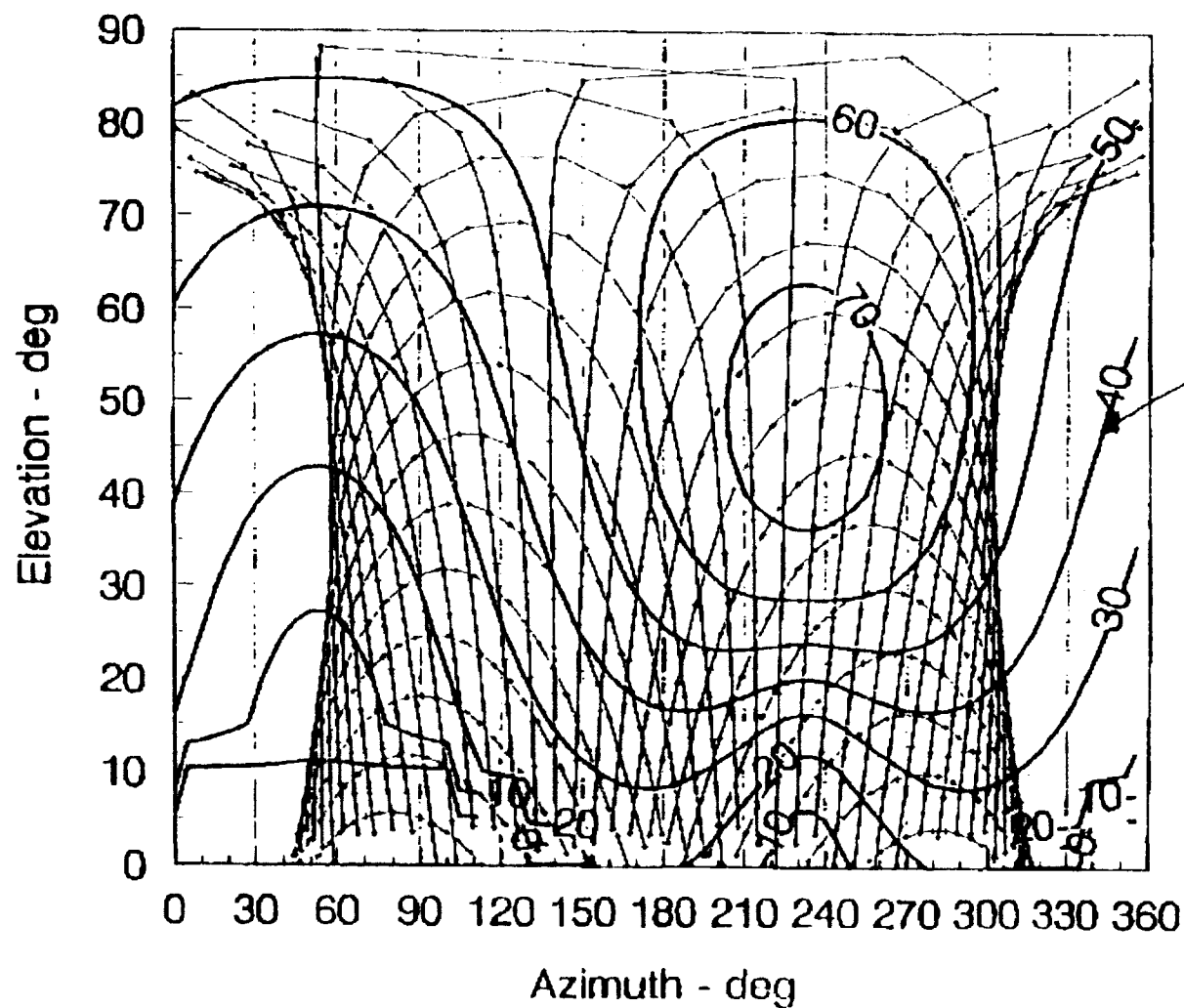


Figure 3-14

**S/C Viewing Separation Angle Of Stations**  
**Iridium S/C Viewing of Stations**  
**Station View For Portland, Maine (Odyssey)**  
**Secondary Station: Atlanta (Iridium)**  
**Odyssey Tracking At 5 Minute time Tics**



Separation Angle For  
Iridium S/C Viewing  
Of Earth Stations

Figure 3-15

\* Based on the geometry, the separation angle is 3.8 degrees.  
However, in our simulation analysis, the separation angle is at least 10 degrees as shown in Figure 3-13.

Table 3-1 summarizes the potential interference between Odyssey<sup>TM</sup> earth stations and the Iridium satellites

Table 3-1: Interference Level At the Iridium Satellite

Recommended Criteria		Interference Level At The Iridium Satellites		
Max Allowed %Time	Interference Level	- From Odyssey E/S at San Luis Obispo - Viewing to Iridium E/S At Las Vegas	- From Odyssey E/S at Portland (Maine) - Viewing to Iridium E/S At Montpelier	
		Separation angle=9.6°		Separation Angle
			3.8°	10°
0.87	$I = 0.06 N_T$	-	-	
0.119	$I = 0.78 N_T$	0.0001 $N_T$	0.0006 $N_T$	0.0001 $N_T$
0.0294	$I = 2.98 N_T$	0.0001 $N_T$	0.0154 $N_T$	0.0001 $N_T$
0.0004	$I = 14.8 N_T$	0.004 $N_T$	1.1983 $N_T$	0.0036 $N_T$

From Table 3-1, we conclude that the interference level at the Iridium satellite is well below the recommended level. These interference levels also meet the Iridium interference criteria.

### 3.1.1.2 Downlink interference (Interference with Iridium Earth Station)

In this calculation, we assume that the Iridium earth stations at Las Vegas and Montpelier receive the interference from the Odyssey<sup>TM</sup> satellite with the separation angle 0.58 degree.

The potential interference between Odyssey<sup>TM</sup> satellites and the Iridium earth stations are shown in Table 3-2

Table 3-2: Interference Level At Iridium Earth Stations

Recommended Criteria		Interference Level At The Iridium Earth Stations		
Max Allowed %Time	Interference Level	- From Odyssey Satellite Viewing Odyssey E/S at San Luis Obispo - Iridium Earth Station at Las Vegas	- From Odyssey Satellite Viewing Odyssey E/S at Portland (Maine) - Iridium Earth Station at Montpelier	
			Separation Angle	
0.87	$I = 0.06 N_T$	-	0.58°	1°
0.119	$I = 0.78 N_T$	0.0737 $N_T$	0.1339 $N_T$	0.1098 $N_T$
0.0294	$I = 2.98 N_T$	1.7750 $N_T$	3.2238 $N_T$	2.644 $N_T$
0.0004	$I = 14.8 N_T$	3.3100 $N_T$	6.0117 $N_T$	4.93 $N_T$

From Table 3-2, we conclude that

- \* The interference level at the Iridium Earth Station at Las Vegas is well below the recommended level.
- \* The interference level at the Iridium earth station at Montpelier is 0.34 dB above the recommended level ( $10\log(3.22/2.98) = 0.34$  dB). Since the exceeded level is very small, we can conclude that the interference level at the Iridium earth stations is within allowable levels. However, based on the Figure 3-18, the separation angle for the Odyssey<sup>TM</sup> spacecraft viewing of the earth stations at Portland and Montpelier is greater than or equal to 1 degree. In this case, the interference level at the Iridium is well below the recommended level as shown Table 3-2.

### 3.1.2 Odyssey<sup>TM</sup> Victim

Figure 3-16 illustrates the Iridium earth station interference with the Odyssey<sup>TM</sup> satellite.

Figure 3-17 shows the potential interference between the Iridium earth station at Las Vegas and the Odyssey<sup>TM</sup> satellites viewing the Odyssey<sup>TM</sup> earth station at San Luis Obispo, CA

Figure 3-18 shows the potential interference between the Iridium earth station at Montpelier and the Odyssey<sup>TM</sup> satellite viewing the Odyssey<sup>TM</sup> earth station at Portland, Maine.

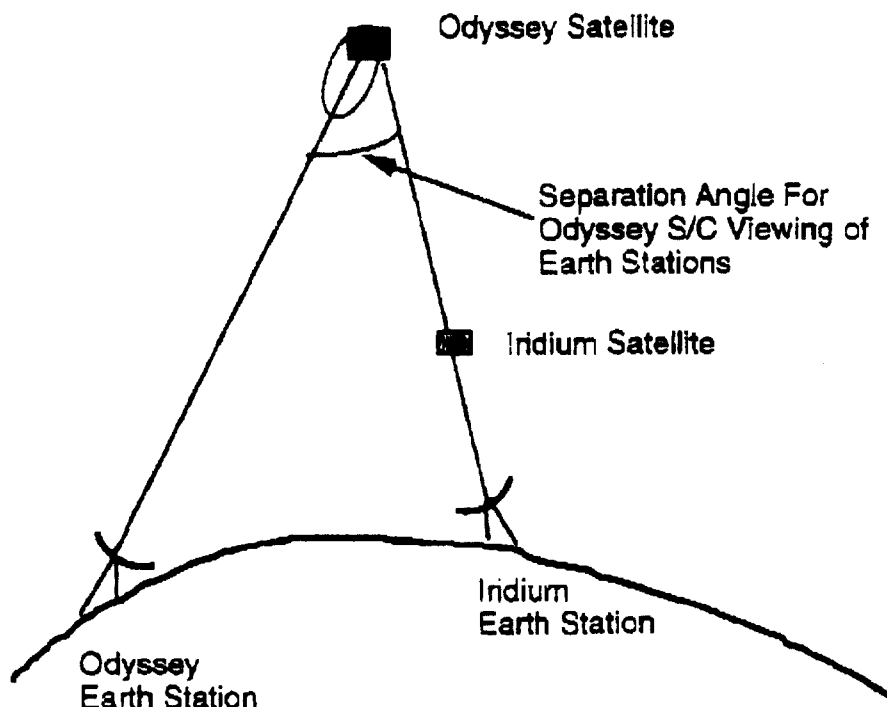


Figure 3-16: Iridium Station Interference With Odyssey<sup>TM</sup> Satellites

**S/C Viewing Separation Angle Of Stations**  
**Odyssey S/C Viewing of Stations**  
**Station View For San Luis Obispo (Odyssey)**  
**Secondary Station: Las Vegas(Iridium)**  
**Odyssey Tracking At 5 Minute time Tics**

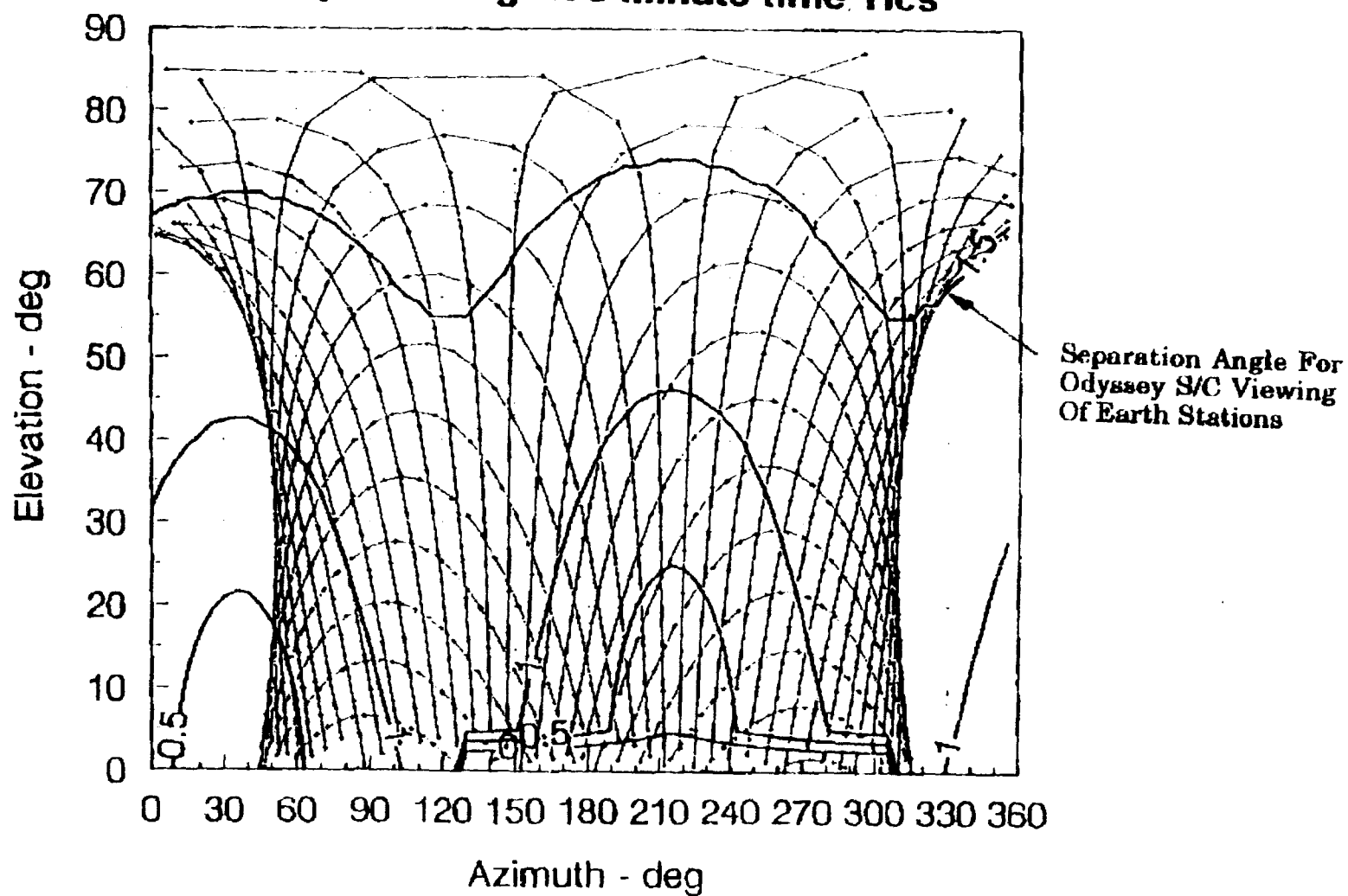


Figure 3-17



**Figure 3-18**

### 3.1.2.1 Uplink interference (Interference with Odyssey™ Satellite)

Table 3-3 summarizes the potential interference between Iridium earth stations and the Odyssey™ satellites

Recommended Criteria		Interference Level At The Odyssey Satellites	
Max Allowed %Time	Interference Level	- From Iridium E/S at Las Vegas - Viewing to Odyssey E/S At San Luis Obispo, CA	- From Iridium E/S at Montpelier - Viewing to Odyssey E/S At Portland, Maine
0.87	$I = 0.06 N_T$	-	-
0.119	$I = 0.78 N_T$	0.0121 $N_T$	0.0369 $N_T$
0.0294	$I = 2.98 N_T$	0.2909 $N_T$	0.08890 $N_T$
0.0004	$I = 14.8 N_T$	0.5424 $N_T$	1.6577 $N_T$

From Table 3-4, we conclude that the interference level at the Odyssey™ satellite is well below the recommended level.

### 3.1.2.2 Downlink interference (Interference with Odyssey™ Earth Station)

The potential interference between Iridium satellites and the Odyssey™ earth stations are shown in Table 3-4

Table 3-4: Interference Level At Odyssey™ Earth Stations

Recommended Criteria		Interference Level At The Odyssey Earth Stations	
Max Allowed %Time	Interference Level	- From Iridium Satellite Viewing Iridium E/S at Las Vegas - Odyssey Earth Station at San Luis Obispo	- From Iridium Satellite Viewing Iridium E/S at Montpelier - Odyssey Earth Station at Portland, Maine
0.87	$I = 0.06 N_T$	-	-
0.119	$I = 0.78 N_T$	0.0001 $N_T$	0.0006 $N_T$
	$I = 2.98 N_T$	0.0006 $N_T$	0.0145 $N_T$
0.0004	$I = 14.8 N_T$	0.0011 $N_T$	0.0269 $N_T$

From Table 3-4, we conclude that the interference level at the Odyssey™ earth station are well below the recommended levels.

#### 40 Conclusion

Based on our analysis, the levels of interference at either the Odyssey<sup>TM</sup> satellite/earth station receiver or the Iridium satellite/earth station receiver are well below the recommended levels (CPM 95/118 at 43 (Table 8A)). For the uplink, at the satellite receiver, these interference levels also meet the Iridium interference criteria. However, for the down link, at the Iridium earth station receiver, the interference level is slightly higher than the Iridium interference criteria.

Again, for all the calculations, we assumed both that the Odyssey<sup>TM</sup> and the Iridium system transmit at full power under clear sky conditions, which is at least 10 to 20 dB higher than the normal transmission. In this analysis, we used the CCIR Recommendation for all the earth station and satellite antenna patterns. If the actual antenna patterns were used, then the level of interference will be significantly reduced.

We recommend that interference between the Odyssey<sup>TM</sup> and the Iridium systems should be analyzed using the actual antenna patterns, and the earth station locations (latitude & longitude).

We conclude that the Odyssey<sup>TM</sup> system and the Iridium system can share the 29.1 - 29.4 GHz and 19.3 - 19.6 GHz bands on a co-directional basis for their feeder link operations.

**ATTACHMENT 2**

§ 25.257 Special requirements for operations in the band 29.1- 29.25 GHz

(a) Special requirements for operations in the band 29.1-29.25 GHz.

(1) A maximum of two non Non-geostationary mobile satellite service (non-GSO MSS) operators shall be licensed to use the 29.1-29.25 GHz band for Earth-to-space transmissions from feeder link earth station complexes. For purposes of this subsection, a "feeder link earth station complex" may include up to three (3) earth station groups, with each earth station group having up to four (4) antennas, located within a radius of 75 nautical miles of a given set of geographic coordinates provided by a non-GSO MSS operator pursuant to ~~subsections (e)(5) or (e)(6)(i)~~ section 21.1002.

(2) A maximum of eight (8) feeder link earth station complexes in the contiguous United States, Alaska, and Hawaii may be ~~operated concurrently~~ placed into operation in the band 29.1-29.25 GHz.

(3) One of the non-GSO MSS operators licensed to use the 29.1-29.25 GHz band may specify geographic coordinates for a maximum of eight feeder link earth station complexes that transmit in the 29.1-29.25 GHz band. A maximum of six of these feeder link earth station complexes may be placed into operation. The other non-GSO MSS operator licensed to use the 29.1-29.25 GHz band may specify geographic coordinates for a maximum of two feeder link earth station complexes that transmit in the 29.1-29.25 GHz band. Both of these feeder link earth station complexes may be placed into operation. The selection of the feeder link earth station complex locations shall be made in accordance with section 21.1002.

(4) Both non-GSO MSS operators shall cooperate fully and make reasonable efforts to identify mutually acceptable locations for feeder link earth station complexes. In this connection, any single non-GSO MSS operator shall only identify one feeder link earth station complex protection zone in each category identified in section 21.1002(c)(2) until the other non-GSO MSS operator has been given an opportunity to select a location from that same category.

~~(b) Coordination of LMDS systems and geostationary fixed satellite systems in the band 29.1-29.25 must be done in accordance with the technical standards of §§ 21.1018-21.1024.~~

## § 21.1002 Frequencies

### (c) Special requirements for operations in the band 29.1-29.25 GHz

(1)(i) LMDS receive stations operating on frequencies in the 29.1-29.25 GHz band within a radius of 75 nautical miles of the geographic coordinates provided by a non-GSO MSS licensee pursuant to subsections (c)(2) or (c)(3)(i) (the "feeder link earth station complex protection zone") shall accept any interference caused to them by such earth station complexes and shall not claim protection from such earth station complexes.

(ii) LMDS licensees operating on frequencies in the 29.1-29.25 GHz band outside a feeder link earth station complex protection zone shall cooperate fully and make reasonable efforts to resolve technical problems with the non-GSO MSS licensee to the extent that transmissions from the non-GSO MSS operator's feeder link earth station complex interfere with an LMDS receive station.

(2) ~~At least 45 days prior to~~ **No more than 15 days after the release of a public notice announcing** the commencement of LMDS auctions, feeder link earth station complexes **to be licensed pursuant to Section 25.257** shall be specified by a set of geographic coordinates in accordance with the following requirements: no feeder link earth station complex may be located in the top eight (8) metropolitan statistical areas ("MSAs"), ranked by population, as defined by the Office of Management and Budget as of June 1993, using estimated populations as of December 1992; two (2) complexes may be located in MSAs 9 through 25, one of which must be Phoenix, AZ (for a complex at Chandler, AZ); ~~one (1) complex~~ **two (2) complexes** may be located in MSAs 26 to 50; ~~three (3)~~ **two (2)** complexes may be located in MSAs 51 to 100, one of which must be Honolulu, Hawaii (for a complex at Waimea); and ~~the two (2)~~ **four (4)** remaining complexes must be located at least 75 nautical miles from the borders of the 100 largest MSAs or in any MSA not included in the 100 largest MSAs. Any location allotted for one range of MSAs may be taken from an MSA below that range.

(3)(i) Any non-GSO MSS licensee may at any time specify sets of geographic coordinates for feeder link earth station complexes with each earth station contained therein to be located at least 75 nautical miles from the borders of the 100 largest MSAs.

(ii) For purposes of subsection (c)(3)(i), non-GSO MSS feeder link earth station complexes shall be entitled to accommodation only if the affected non-GSO MSS licensee reapplies to the Commission for a feeder link earth station complex or certifies to the Commission within sixty days of receiving a copy of an LMDS application that it intends to file an application for a feeder link earth station complex within six months of the date of receipt of the LMDS application.

(iii) If said non-GSO MSS licensee application is filed later than six months after certification to the Commission, the LMDS and non-GSO MSS entities shall still cooperate fully and make reasonable efforts to resolve technical problems, but the LMDS licensee shall not be obligated to re-engineer its proposal or make changes to its system.

(4) LMDS licensees or applicants proposing to operate hub stations on frequencies in the 29.1-29.25 GHz band at locations outside of the 100 largest MSAs or within a distance of 150 nautical miles from a set of geographic coordinates specified under subsection (c)(2) or (c)(3)(i) shall serve copies of their applications on all non-GSO MSS applicants, permittees or licensees meeting the criteria specified in § 25.257(a). Non-GSO MSS licensees or applicants shall serve copies of their feeder link earth station applications on any LMDS applicant or licensee within a distance of 150 nautical miles from the geographic coordinates that it specified under subsection (c)(2) or (c)(3)(i). Any necessary coordination shall commence upon notification by the party receiving an application to the party who filed the application. The results of any such coordination shall be reported to the Commission within sixty days. The non-GSO MSS earth station licensee shall also provide all such LMDS licensees with a copy of its channel plan.